

Arctiini Leach, [1815] (Lepidoptera, Erebidae, Arctiinae) of the Brazilian Amazon. II — Subtribe Pericopina Walker, [1865]

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Abstract: This study aims to identify and record specimens of the lepidopteran tribe Arctiini from the Brazilian Amazon, as well as update the previous lists of this tribe, based on specimens from collections and a literature review. Sixty-two species of Pericopina were recorded, of which six are newly recorded from the Brazilian Amazon.

Key words: Amazon; day-flying moths; inventory; Noctuoidea; tiger moths

INTRODUCTION

There are approximately 6,000 species of Arctiinae moths in the Neotropical Region (Heppner 1991). Worldwide, the arctiine moths are divided among four tribes (Zahiri et al. 2012), but only the Arctiini and Lithosiini occur in the Neotropics. Arctiini has six subtribes: Arctiina, Callimorphina, Ctenuchina, Euchromiina, Phaegopterina, and Pericopina (Weller et al. 2009).

The pericopine moths are found only in the Neotropics, where there are 360 known species (Vincent and Laguerre 2014). Several species are diurnal and are involved in mimicry rings with other lepidopterans (Simons 2009). However, males of some species are nocturnal while the females are day-flying (Travassos Filho 1947). Many species of Pericopina are aposematic and have strong sexual dimorphism. They possess a pair of tympanic organs located in the abdomen basis. The male genitalia has the unco divided or deeply bifid (Kitching and Rawlins 1999).

We present a list of Pericopina moths occurring in the Brazilian Amazon. We built the species list mainly from specimens deposited in the major Brazilian

collections and also use data from literature. This work, a continuation of Teston and Ferro (2016), aims to increase knowledge of the diversity of Arctiinae subfamily in the Amazon region.

MATERIALS AND METHODS

We made intensive literature searches and examined the entomological collections of the Instituto Nacional de Pesquisas na Amazônia (INPA; Manaus), Museu Paraense Emílio Goeldi (MPEG; Belém), Coleção Becker (VOB; Camacan), Coleção Entomológica Padre Jesus Santiago Moure of the Universidade Federal do Paraná (DZUP; Curitiba), Fundação Instituto Oswaldo Cruz (FIOC; Rio de Janeiro), Museu de Zoologia of the Universidade de São Paulo (MZUSP; São Paulo), Museu Nacional of the Universidade Federal do Rio de Janeiro (MNRJ; Rio de Janeiro), and Laboratório de Estudos de Lepidópteros Neotropicais (LELN) of the Universidade Federal do Oeste do Pará (UFOPA; Santarém). To identify the species, we used the literature (Hering 1925; Seitz 1919–1925; Watson and Goodger 1986) and specimens of the visited collections, which the voucher specimens are deposited. The systematic organization to generic level follows Becker (2013), Laguerre et al. (2014), and Vincent and Laguerre (2014), and corrected authorship of some species follows Nässig and Speidel (2007).

The research study area is the Brazilian Amazon biome (Figure 1), and the geographical coordinates of the localities were obtained from the Geo Loc tool of “Species Link date & tools” (<http://splink.cria.org.br/geoloc>).

The list is organized alphabetically. Species and records without precise location data, and those from locations that belong to two biomes (e.g., Cerrado and Amazon) were not included in the list.

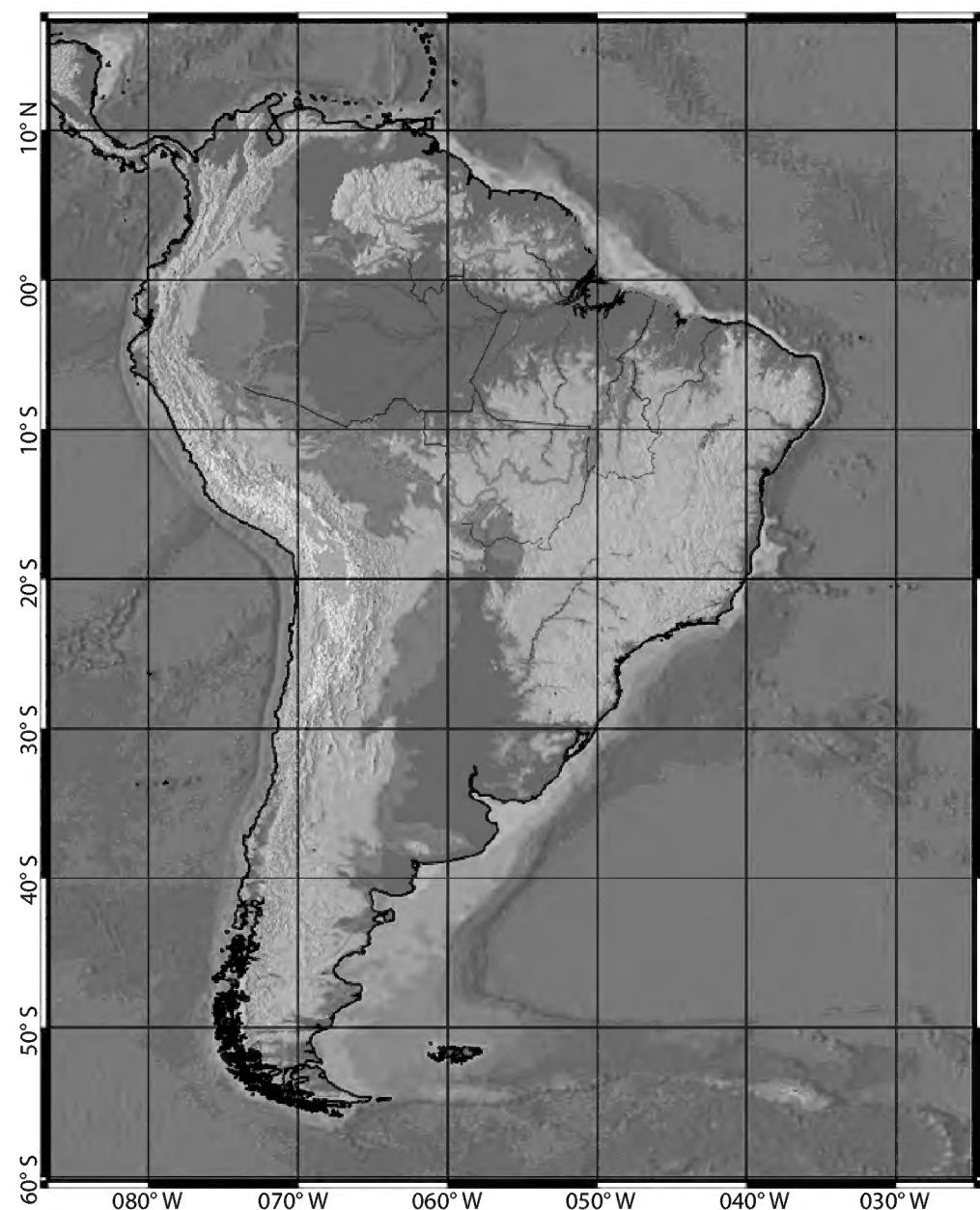


Figure 1. Map of the highlighted area of study Brazilian Amazon biome.

RESULTS

A list of 62 species is presented (Table 1), including six new occurrences for the Brazilian Amazon (indicated by “NEW”). Three species appear as new records for the municipalities and their respective states (indicated by “AMZ”). In total, 48 Amazonian municipalities had records of Pericopina species (Figure 2; Table 2). São Paulo de Olivença (AM), Belém (PA), and Tefé (AM) were the municipalities with the most species and subspecies, with 20, 17, and 13, respectively.

We recorded 11 genera, of which four were monospecific. *Dysschema* Hübner, 1818 and *Hyalurga* Hübner, [1819] had the most species (13), followed by *Hypocrita* Hübner, [1807] (12), and *Calodesma* Hübner, [1820] (10). The species with the greatest number of locality records were *Chetone catilina catilina* (Cramer, [1776]) (with 17), followed by *Hypocrita plagifera* (C. Felder & R. Felder, 1862) (15), *Hypocrita bicolora* (Sulzer, 1776) (13) and *Hyalurga fenestra* (Linnaeus, 1758) (12). Thirty species (48.4%) occurred in only one locality (Table 1).

DISCUSSION

The number of pericopine species recorded for the Brazilian Amazon is higher than for the Brazilian Cerrado (39 species, Ferro et al. 2010). Teston and Ferro

Table 1. Species of Pericopina (Erebidae, Arctiinae, Arctiini) from the Brazilian Amazon. The record column shows the Brazilian state in abbreviated form followed by municipality. The name of the locality is enclosed in braces and the author of the first record is in parentheses. * New record. States abbreviations: AC = Acre, AM = Amazonas, AP = Amapá, MA = Maranhão, MT = Mato Grosso, PA = Pará, RO = Rondônia, and RR = Roraima.

No.	Species	Record
1	<i>Calodesma amica amica</i> (Stoll, [1781]) NEW	AM, Fonte Boa*; PA, Óbidos*; RO, Cacaulândia*
2	<i>Calodesma collaris</i> (Drury, 1872)	AM, Fonte Boa*, Novo Airão {Jaú National Park}*; MA, Açailândia*; PA, Altamira {Monte Santo} (Teston and Delfina 2010) and {Serra do Pardo National Park} (Teston and Correa 2015), Novo Progresso {Cachimbo}*, São Félix do Xingu {Serra do Pardo National Park} (Teston and Correa 2015); RO, Cacaulândia*
3	<i>Calodesma contracta</i> (Walker, 1854) NEW	PA, Novo Progresso {Cachimbo}*; RO, Cacaulândia*
4	<i>Calodesma dilutana</i> (Druce, 1907)	AM, Amazons (Druce 1907)
5	<i>Calodesma diopis</i> (C. Felder & R. Felder, 1874)	AM, Amazon River (Felder and Felder 1874), Manaus*, Novo Airão {Jaú National Park}*; PA, Altamira {Monte Santo} (Teston and Delfina 2010), São Félix do Xingu {Serra do Pardo National Park} (Teston and Correa 2015); RO, Cacaulândia*, Candeias do Jamari*
6	<i>Calodesma eucyanoides</i> Hering, 1925	AM, São Paulo de Olivença (Hering 1925)
7	<i>Calodesma exposita</i> (Butler, 1877)	PA, [Belém] (Butler 1877)
8	<i>Calodesma itaitubae</i> Hering, 1925	PA, Itaituba (Hering 1925)
9	<i>Calodesma maculifrons</i> (Walker, [1865]) NEW	RO, Jaru*
10	<i>Calodesma tamara</i> Hering, 1925	AM, São Paulo de Olivença (Hering 1925)
11	<i>Chetone catilina catilina</i> (Cramer, [1776])	AM, Tefé {Ega}(Walker 1854b); AP, Serra do Navio*; MA, Santa Luzia*; MT, Aripuanã*; PA, Altamira*, [Belém] (Walker 1854b), Itaituba*, Novo Progresso {Cachimbo} (Moraes 2014), Óbidos*, Oriximiná {Cuminá River}*, Parauapebas {Serra Norte, Carajás}*, Santarém {Taperinha}*, São Félix do Xingu {Serra do Pardo National Park} (Teston and Correa 2015), Tapajós [River] (Walker 1854b); RO, Cacaulândia*, Candeias do Jamari*; RR, Alto Alegre*
12	<i>Chetone histrio histrio</i> Boisduval, 1870	AM, Benjamin Constant (Moraes 2014), Carauari*, São Gabriel da Cachoeira*, São Paulo de Olivença*
13	<i>Chetone isse</i> (Hübner, [1831])	AM, Tefé {Ega}(Butler 1872)
14	<i>Chetone ithrana ithrana</i> (Butler, 1871)	AC, Bujari*, Porto Acre*, Senador Guimard*; AM, Amazons (Butler 1871b), Benjamin Constant*, Borba*, São Paulo de Olivença*
15	<i>Chetone mimica phyleis</i> (Druce, 1885) AMZ	AC, Bujari*, Porto Walter*, Rio Branco*; RO, Cacaulândia*, Ouro Preto do Oeste*
16	<i>Chetone phaeba</i> Boisduval, 1870	AM, Benjamin Constant (Moraes 2014), Tefé {Ega} (Butler 1875)
17	<i>Crocromela theophrastus</i> Hering, 1926	[AM], Amazonas (Hering 1926)
18	<i>Ctenuchidia butus</i> (Fabricius, 1787)	PA, [Belém] (Walker 1854a)
19	<i>Dysschema eurocilia eurocilia</i> (Cramer, 1777)	[AM], Amazon River (Perty [1833]), AM, Amazonas (Hering 1925), Benjamin Constant*, São Paulo de Olivença (Moraes 2014); PA, Novo Progresso {Cachimbo}*, Santarém (Moraes 2014); RO, Cacaulândia*, Cacoal*
20	<i>Dysschema forbesi</i> (Druce, 1907)	AM, Manaus*, Maués*; MA, Açailândia*; PA, Belém {Utinga} (Moraes 2014)

Continued

Table 1. Continued.

No.	Species	Record
21	<i>Dysschema fulgorata</i> (Butler, 1871)	PA, [Belém] (Butler 1871b)
22	<i>Dysschema hypoxantha hypoxantha</i> Hübner, 1818 ^{AMZ}	MA, Açailândia*; PA, Novo Progresso {Cachimbo}*
23	<i>Dysschema jansonis</i> (Butler, [1870])	AM, Amazonas (Moraes 2014), São Paulo de Olivença*, Tefé*; PA, Óbidos*
24	<i>Dysschema larvata</i> (Walker, 1856)	[AM], Valley of the Amazon [River](Walker 1856)
25	<i>Dysschema neda</i> (Klug, 1836) ^{AMZ}	RO, Ji-Paraná*
26	<i>Dysschema picta</i> (Guerin-Meneville, [1844]) ^{NEW}	AM, Fonte Boa*; AP, Serra do Navio*
27	<i>Dysschema rosina</i> (Butler, 1871)	AC, Porto Walter*; AM, Benjamin Constant (Moraes 2014), São Paulo de Olivença (Dognin 1923), Tefé {Ega} (Butler 1871a)
28	<i>Dysschema sacrifica</i> (Hübner, [1831])	MA, Açailândia*; PA, Altamira {Monte Santo} (Teston and Delfina 2010)
29	<i>Dysschema salome</i> (Druce, 1910) ^{NEW}	PA, Óbidos*, São Miguel do Guamá*
30	<i>Dysschema thyridina</i> (Butler, 1871)	AM, Benjamin Constant (Moraes 2014)
31	<i>Dysschema tricolora</i> (Sulzer, 1776) a) <i>Dysschema tricolora obscurata</i> (Reich, 1934) b) <i>Dysschema tricolora tricolora</i> (Sulzer, 1776)	AM, São Paulo de Olivença (Reich 1934) AM, Amazonas (Hering 1925), Maués*, São Gabriel da Cachoeira*; PA, [Belém] (Butler 1872), Altamira {51°BIS} (Teston <i>et al.</i> 2012), Óbidos (Moraes 2014), São Félix do Xingu {Serra do Pardo National Park} (Teston and Correa 2015); RR, Alto Alegre*, Pacaraima*
32	<i>Hyalurga albovitrea</i> Walker, [1865]	AM, Tefé {Ega} (Walker [1865])
33	<i>Hyalurga batesi</i> (Druce, 1893)	AM, São Paulo [de Olivença] (Druce 1893)
34	<i>Hyalurga fenestra</i> (Linnaeus, 1758)	AC, Xapuri*; AM, Benjamin Constant*, Humaitá {Rio Madeira} (Watson and Goodger 1986),São Gabriel da Cachoeira*, São Paulo de Olivença*, Tefé {Ega} (Butler 1875); AP, Serra do Navio*; PA, Altamira {51°BIS} (Teston <i>et al.</i> 2012), Belém*, Óbidos*; RO, Cacaulândia*; RR, Alto Alegre*
35	<i>Hyalurga fenestrata</i> (Walker, 1855)	PA, [Belém] (Walker 1855)
36	<i>Hyalurga lauronoides</i> Hering, 1925	AM, Boa Vista do Ramos {Massauari} (Hering 1925)
37	<i>Hyalurga leucophaea</i> (Walker, 1854) a) <i>Hyalurga leucophaea gabrielis</i> Bryk, 1953 b) <i>Hyalurga leucophaea leucophaea</i> (Walker, 1854)	AM, São Gabriel [da Cachoeira] (Bryk 1953) AM, Benjamin Constant (Moraes 2014), Manaus*, São Paulo de Olivença*; AP, Serra do Navio*; PA, [Belém] (Walker 1854b), Oriximiná {Cuminá River}*; RO, Ariquemes*, Cacaulândia*
38	<i>Hyalurga leucophlebia</i> Hering, 1925	AM, Boa Vista do Ramos {Massauari} (Hering 1925), Manaus*, São Paulo de Olivença*; PA, Altamira {Monte Santo} (Teston and Delfina 2010), Itaituba (Hering 1925), São Félix do Xingu {Serra do Pardo National Park} (Teston and Correa 2015)
39	<i>Hyalurga melania</i> Hering, 1925	AM, Rio Jurua (Lamas and Grados 1996)
40	<i>Hyalurga misys</i> (Erichson, 1848)	AP, Serra do Navio*; MA, Açailândia*; PA, Altamira {51°BIS} (Teston <i>et al.</i> 2012), Belém*
41	<i>Hyalurga partita</i> (Walker, 1854)	AM, Tefé {Ega} (Walker [1865]); PA, [Belém] (Walker 1854b), Capitão Poço*; RO, Cacaulândia*
42	<i>Hyalurga pura</i> Butler, 1875	PA, [Belém] (Butler 1875)
43	<i>Hyalurga scotina</i> Hering, 1925	AM, Benjamin Constant*, São Paulo [de Olivença] (Hering 1925)
44	<i>Hyalurga whiteleyi</i> Druce, 1911	AM, São Paulo [de Olivença] (Hering 1925)
45	<i>Hypocrita bicolora</i> (Sulzer, 1776)	AM, Benjamin Constant*, Borba*, Manacapuru*, Manaus*, Maués*, São Paulo de Olivença*, Tefé {Ega} (Butler 1875); AP, Serra do Navio*; PA, [Belém], (Walker 1854b), Gurupá*, Itaituba*, Óbidos*, Santarém {Taperinha} (Moraes 2014)
46	<i>Hypocrita calida</i> (C. Felder & R. Felder, 1874)	PA, Almeirim {Jari} (Hawes <i>et al.</i> 2009)
47	<i>Hypocrita celadon</i> (Cramer, [1777]) ^{NEW}	AP, Serra do Navio*
48	<i>Hypocrita confluens</i> Butler, 1872 ^{AMZ}	AC, Senador Guimard*, Xapuri*; AM, São Paulo de Olivença*; MT, Aripuanã*; PA, Parauapebas {Serra Norte, Carajás}*, Santarém*; RO, Cacaulândia*, Porto Velho*
49	<i>Hypocrita crocata</i> (Druce, 1899)	[AM], Upper Amazon (Druce 1899)
50	<i>Hypocrita eulalia</i> (Druce, 1899)	[AM], Upper Amazon (Druce 1899)
51	<i>Hypocrita excellens</i> (Walker, 1854)	PA, Almeirim {Jari} (Hawes <i>et al.</i> 2009)
52	<i>Hypocrita glauca</i> (Cramer, 1777)	AM, Manicoré (Hering 1925), Tefé {Ega} (Walker 1866); PA, [Belém] (Butler 1872), Gurupá*, Óbidos*; RO, Porto Velho*
53	<i>Hypocrita plagifera</i> (C. Felder & R. Felder, 1862)	AC, Porto Walter*, Xapuri*; AM, Benjamin Constant (Moraes 2014), Borba (Moraes 2014), São Gabriel da Cachoeira*, São Paulo de Olivença*, Tefé*, Upper Rio Negro (Felder and Felder, 1862); PA, Santarém*, Tapajós [River] (Moraes 2014); RO, Cacaulândia*, Jaru*, Ouro Preto do Oeste*, Porto Velho*, Vila Rondônia*
54	<i>Hypocrita speciosa</i> (Walker, 1866)	AM, Maués*, Amazon River (Felder and Rogenhofer 1874), Upper Amazonas (Hering 1925)
55	<i>Hypocrita strigifera</i> (Hering, 1925)	PA, Itaituba (Hering 1925)
56	<i>Hypocrita temperata</i> (Walker, 1856)	AM, Benjamin Constant*, São Paulo de Olivença*, Tefé {Ega} (Butler 1874); PA, Novo Progresso {Cachimbo}*, Óbidos*, Tapajós [River] (Walker 1856); RO, Cacaulândia*
57	<i>Isostola divisa</i> (Walker, 1854)	AM, São Paulo de Olivença*, Tefé*; PA, [Belém] (Walker 1854b)
58	<i>Isostola rhodobroncha</i> C. Felder & R. Felder, 1874	[AM], Amazonas [River] (Felder and Felder 1874)
59	<i>Notophyson heliconides</i> (Swainson, 1833)	AC, Porto Walter*, Senador Guimard*; AM, Amazonas (Hering 1925), Benjamin Constant (Moraes 2014), São Paulo de Olivença*; MA, Açailândia*
60	<i>Notophyson tiresias</i> (Cramer, [1776])	PA, [Belém] (Walker 1854b)
61	<i>Phaloe ignita</i> (Butler, [1870])	PA, Tapajós [River] (Butler [1870])
62	<i>Thyrgis marginata</i> (Butler, 1875)	AM, Tefé {Ega} (Kirby 1892)

^{AMZ} Species recorded for states within the Amazon biome by Ferro and Diniz (2010), but without precise location and biome information. So these species are new records for the municipalities. ^{NEW} New record for the Brazilian Amazon.

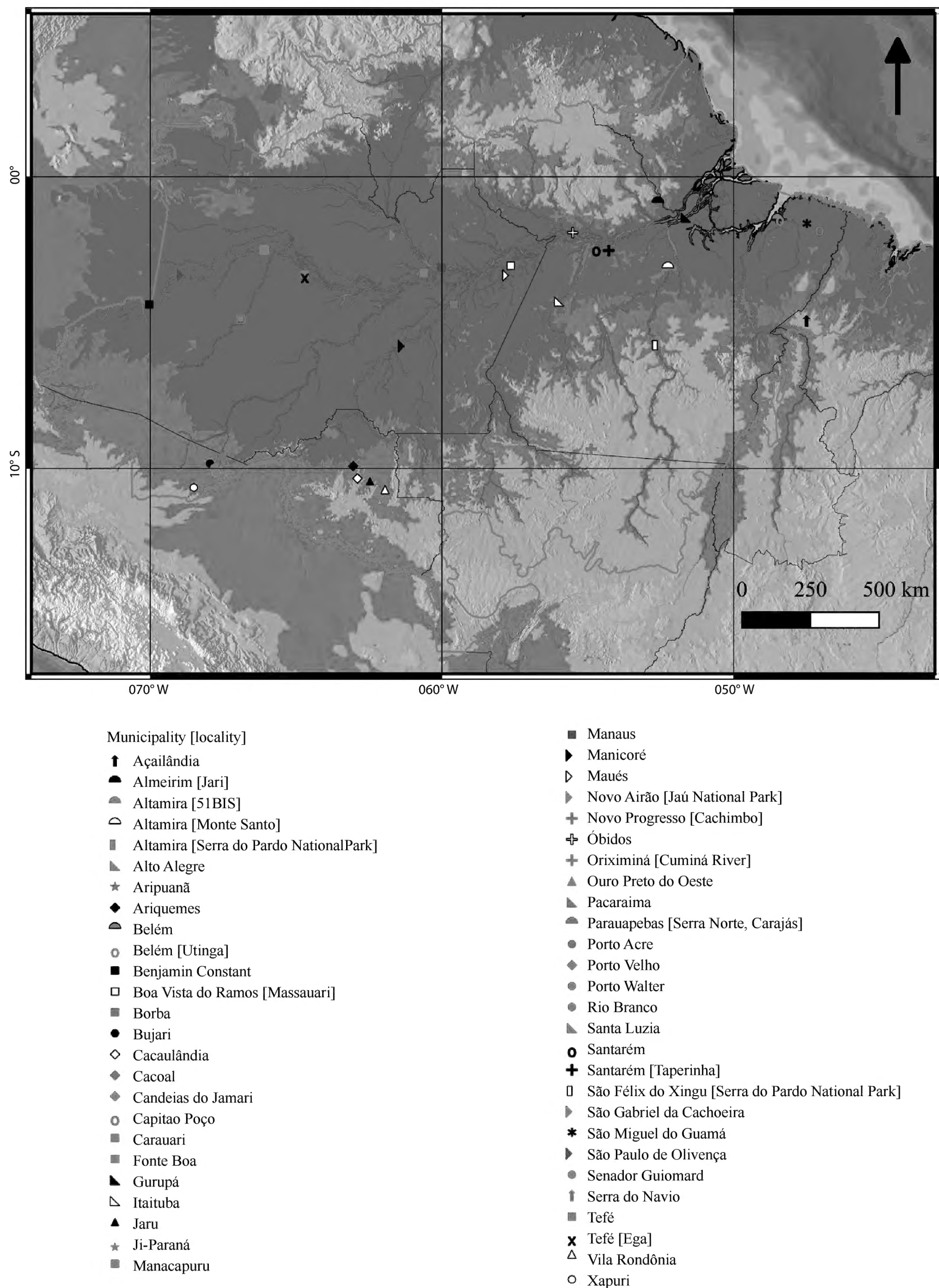


Figure 2. Geographic distribution of Pericopina species in Brazilian Amazon biome.

Table 2. Geographic coordinates of municipalities and localities of the species of Pericopina (Erebidae, Arctiinae, Arctini) in the Brazillian Amazon biome.

State	Municipality	Locality	Latitude	Longitude
Acre	Bujari		09°49'51"S	067°57'08"W
Acre	Porto Acre		09°35'18"S	067°31'57"W
Acre	Porto Walter		08°16'07"S	072°44'37"W
Acre	Rio Branco		09°58'29"S	067°48'35"W
Acre	Senador Guiomard		10°09'04"S	067°44'09"W
Acre	Xapuri		10°39'06"S	068°30'15"W
Amapá	Serra do Navio		00°53'45"N	052°00'07"W
Amazonas	Benjamin Constant		04°22'60"S	070°01'52"W
Amazonas	Boa Vista do Ramos	Massauari	03°03'19"S	057°38'20"W
Amazonas	Borba		04°23'17"S	059°35'37"W
Amazonas	Carauari		04°52'59"S	066°53'45"W
Amazonas	Fonte Boa		02°30'51"S	066°05'30"W
Amazonas	Manacapuru		03°17'59"S	060°37'14"W
Amazonas	Manaus		03°06'07"S	060°01'30"W
Amazonas	Manicoré		05°48'34"S	061°18'00"W
Amazonas	Maués		03°23'01"S	057°43'07"W
Amazonas	Novo Airão	Jaú National Park	02°00'39"S	061°35'57"W
Amazonas	São Gabriel da Cachoeira		00°07'50"S	067°05'20"W
Amazonas	São Paulo de Olivença		03°22'42"S	068°52'20"W
Amazonas	Tefé		03°21'16"S	064°42'40"W
Amazonas	Tefé	Ega	03°22'01"S	064°41'59"W
Maranhão	Açailândia		04°56'49"S	047°30'17"W
Maranhão	Santa Luzia		03°57'48"S	045°39'29"W
Mato Grosso	Aripuanã		10°10'01"S	059°27'33"W
Pará	Almeirim	Jari†	00°53'S	052°36'W
Pará	Altamira	51°BIS†	03°11'55"S	052°10'15"W
Pará	Altamira	Monte Santo†	03°07'22"S	052°15'17"W
Pará	Altamira	Serra do Pardo National Park†	05°38'21.9"S	052°41'52.1"W
Pará	Belém		01°27'21"S	048°30'15"W
Pará	Belém	Utinga	01°25'01"S	048°24'37"W
Pará	Capitão Poço		01°44'48"S	047°03'33"W
Pará	Gurupá		01°24'18"S	051°38'23"W
Pará	Itaituba		04°16'35"S	055°59'01"W
Pará	Novo Progresso	Cachimbo	09°19'60"S	054°52'59"W
Pará	Óbidos		01°55'04"S	055°31'04"W
Pará	Oriximiná	Cuminá River	01°21'60"S	056°04'44"W
Pará	Parauapebas	Serra Norte, Carajás	06°00'56"S	050°17'51"W
Pará	Santarém		02°26'36"S	054°42'29"W
Pará	Santarém	Taperinha	02°31'60"S	054°16'59"W
Pará	São Félix do Xingu	Serra do Pardo National Park†	05°46'26.4"S	052°37'13.1"W
Pará	São Miguel do Guamá		01°37'37"S	047°29'00"W
Rondônia	Ariquemes		09°54'48"S	063°02'26"W
Rondônia	Cacaulândia		10°20'21"S	062°53'43"W
Rondônia	Cacoal		11°26'19"S	061°26'50"W
Rondônia	Candeias do Jamari		08°48'35"S	063°41'44"W
Rondônia	Jaru		10°26'20"S	062°27'58"W
Rondônia	Ji-Paraná		10°53'07"S	061°57'06"W
Rondônia	Ouro Preto do Oeste		10°44'54"S	062°12'56"W
Rondônia	Porto Velho		08°45'43"S	063°54'13"W
Rondônia	Vila Rondônia		10°52'01"S	061°57'00"W
Roraima	Alto Alegre		02°53'45"N	061°29'51"W
Roraima	Pacaraima		04°25'53"N	061°08'47"W

Geographic coordinates marked with † are the citations referred, other obtained by Geo Loc tool (see Materials and Methods).

(2016) reported 813 species of Arctiinae from the Brazilian Amazon. Due to the six new species records that we found, the richness has increased to 819 species of tiger moths in the biome.

The municipalities with the most species recorded were widely sampled by several naturalists (e.g., H.W.

Bates) who traveled by Amazon in the 19th and 20th centuries. The pericopine richness in these places is among the greatest recorded at any Brazilian sites. For example, in Salesópolis 16 pericopine species were recorded (Ferro and Diniz 2007), and in Joinville and Seara, 14 species each (Ferro et al. 2012). These three

municipalities were located in the Atlantic Forest biome. However, studies in Cerrado sites recorded a much fewer species of Pericopina. At such places, the richness was found to vary from one to ten species (Ferro and Diniz 2010; Moreno and Ferro 2016; Scherrer et al. 2013). It may be that Pericopina is more diverse in rainforests than in xeric environments.

The Brazilian Amazon richness of Pericopina is equal to 17.2% of the total Neotropical pericopine fauna (Vincent and Laguerre 2014). However, we believe that the richness of this taxon in the Amazon is underestimated. As argued by Santos et al. (2008) regarding butterflies, the northern region of Brazil is very poorly sampled. The large geographical area, difficult access, high costs of fieldwork, and the distances from urban and research centers probably account for the lack of studies in the Amazon. In addition, nocturnal samplings generally do not attract many individuals of Pericopina, and this requires a greater collection effort at each sample site. In addition, many species of Pericopina are active during the day, and not captured at night (when most moth sampling is done). Many pericopine species may also be mistakenly identified as butterflies because they are involved in mimicry rings. All these factors, coupled with low species richness compared to other subtribes of Arctiini, may account for the low representation of Pericopina in collections of Lepidoptera, the main data source of our study.

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